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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PAUL B. MERKEL, GARY N. BARBER,
ALAN R. PITT, AND TREVOR J. WEAR

Appeal 2008-5705
Application 10/622,421
Technology Center 1700

Decided: December 17, 2008

Before EDWARD C. KIMLIN, ADRIENE LEPIANE HANLON, and THOMAS A. WALTZ, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134 from an Examiner's final rejection of claims 1, 4, 6-8, 11, 12, and 22-34.[1] We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

The following Examiner's rejections are before us for review:

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[1] Claims 9, 10, and 13-21 are also pending in the application. Claims 9, 10, and 16-21 have been withdrawn from consideration, and claims 13-15 have been objected to as being dependent on a rejected base claim.

Claims 1, 4, 6-8, 11, 12, 22-29, and 34 are rejected under 35 U.S.C. § 103(a) as unpatentable over Nakano,[2] either alone or in combination with Tsuchiya.[3]

Claims 1, 4, 6-8, 11, 12, and 22-34 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Nakano, Tsuchiya, and Niu.[4]

Claims 1, 4, 6-8, 11, 12, 22-32, and 34 are rejected under 35 U.S.C. § 103(a) as unpatentable over Tsuchiya.[5]

Claims 1 and 33 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Tsuchiya and Nakano.

B. ISSUES

The Appellants contend that Nakano and Tsuchiya do not disclose anionic colloidal silica particles. The Appellants also contend that Nakano does not suggest anionic colloidal silica particles having a size and size distribution as recited in claim 1. The Appellants rely on objective evidence of non-obviousness to establish that the claimed size and size distribution of the anionic colloidal silica particles are critical. Finally, the Appellants contend that the combined teachings of Nakano and Tsuchiya do not render obvious the subject matter of claim 33.

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[2] US 6,919,109 B2 issued to Nakano et al. on July 19, 2005.
[3] US 6,495,242 B1 issued to Tsuchiya et al. on December 17, 2002.
[4] US 6,689,433 B2 issued to Niu et al. on February 10, 2004. The Examiner relies on Niu to "enhance" the teachings of Nakano and Tsuchiya. *See* Examiner's Answer mailed September 20, 2007 ("Ans."), at 12-13. Therefore, we consider the teachings of Niu to be cumulative of the teachings of Nakano and Tsuchiya.
[5] The Examiner withdrew the rejection of claim 33 under 35 U.S.C. § 103(a) as unpatentable over Tsuchiya in the Supplemental Examiner's Answer mailed February 6, 2008 ("Supplemental Ans."), at 2.

Thus, the issues on appeal are:

Issue 1: Have the Appellants shown that the Examiner reversibly erred in finding that the colloidal silica particles disclosed in Nakano and Tsuchiya are anionic?

Issue 2: Have the Appellants shown that the Examiner reversibly erred in finding that Nakano and Tsuchiya suggest anionic colloidal silica particles having a size and size distribution within the range recited in claim 1?

Issue 3: On balance, does the prior art of record and the Appellants' objective evidence of non-obviousness establish that the claimed size and size distribution of the anionic colloidal silica particles are critical?

Issue 4: Have the Appellants shown that the Examiner reversibly erred in finding that Nakano suggests modifying the surface pH of the image-receiving layer in Tsuchiya to between 8 and 10 as recited in claim 33?

C. FINDINGS OF FACT

The following findings of fact are supported by a preponderance of the evidence. Additional findings of fact as necessary appear in the Analysis portion of the opinion.

1. Claimed subject matter

Claims 1 and 33 are representative of the issues on appeal. They read as follows:

> 1. A porous image-recording element comprising a support and an image-receiving layer, wherein said imaging receiving layer comprises anionic colloidal silica particles, hydrophilic polymeric binder, and fluorosurfactant, wherein said binder is present in an amount of between 2% and 15% by weight of said image-receiving layer, said image-recording

> element has a 60-degree gloss of greater than 25, and a dry time of less than 1 minute, wherein said anionic colloidal silica particles have a median diameter of between 80 and 200 nm, wherein at least 80% of said anionic colloidal silica particles have a diameter of within 35% smaller or larger than the median diameter of said anionic colloidal silica particles.
>
> 33. The image-recording element of claim 1 wherein the surface pH of said image-receiving layer moistened with water is between 8 and 10.

App. Br. 12-13,[6] Claims Appendix.

2. Nakano

Nakano discloses an ink-jet recording sheet having a coloring agent accepting layer which contains a dispersion and a water-soluble resin. Nakano 2:65-67.

The dispersion comprises fine particles and a cationic polymer. Nakano 2:50-55.

The fine particles have an average primary particle diameter of 50 nm or less and are composed of colloidal silica, silica fine particles, alumina fine particles, and/or pseudo-boehmite. Nakano 2:59-64.

Nakano discloses that the dispersibility of the fine particles may be improved by treating the surface of the particles with a silane coupling agent. Nakano 18:23-31.

3. Tsuchiya

Tsuchiya discloses an ink-jet recording sheet comprising a support and an ink-absorbable layer comprising fine inorganic particles and a hydrophilic binder. Tsuchiya 2:59-67.

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[6] Appeal Brief dated June 29, 2007.

Examples of fine inorganic particles include colloidal silica. Tsuchiya 5:9-18.

In particular, silica with a diameter of no more than 100 nm, synthesized by a gas phase method, colloidal silica, and pseudoboehmite are preferred. Tsuchiya 5:22-26.

D. PRINCIPLES OF LAW

A claimed invention is not patentable if the subject matter of the invention would have been obvious to a person having ordinary skill in the art at the time the invention was made. 35 U.S.C. § 103(a); *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007); *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 13 (1966).

Facts relevant to a determination of obviousness include (1) the scope and content of the prior art, (2) any differences between the claimed invention and the prior art, (3) the level of skill in the art, and (4) any relevant objective evidence of obviousness or non-obviousness. *KSR*, 127 S. Ct. at 1734; *Graham*, 383 U.S. at 17-18.

A person of ordinary skill is not an automaton but is a person of ordinary creativity. *KSR*, 127 S. Ct. at 1742. One of ordinary skill in the art is presumed to have skills apart from what the prior art references expressly disclose. *In re Sovish*, 769 F.2d 738, 742 (Fed. Cir. 1985).

The question under 35 U.S.C. § 103 is not merely what the references teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made. All disclosures of the prior art, including unpreferred embodiments, must be considered. *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976).

"[O]bjective evidence of nonobviousness must be commensurate in scope with the claims." *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972).

In order for a showing of "unexpected results" to be probative evidence of non-obviousness, it falls upon the Appellants to at least establish: (1) that there actually is a difference between the results obtained through the claimed invention and those of the prior art; and (2) that the difference actually obtained would not have been expected by one skilled in the art at the time of invention. *In re Freeman*, 474 F.2d 1318, 1324 (CCPA 1973).

If rebuttal evidence of adequate weight is produced, the holding of prima facie obviousness is dissipated and all of the evidence is considered anew. *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984)

E. ANALYSIS

1. Issue 1

Nakano discloses an image receiving or coloring agent accepting layer comprising a dispersion. The dispersion comprises fine particles, such as colloidal silica, and a cationic polymer. *See* Nakano 2:50-55; Ans. 3.[7]

The Appellants argue that Nakano does not teach or suggest that the colloidal silica particles in the accepting layer are anionic. App. Br. 2.

The Examiner found that untreated silica is anionic and surface-modified silica is cationic. The Examiner refers to paragraph [0031] of Sismondi[8] and column 9, lines 41-51 of Niu for support. Ans. 9-10; Supplemental Ans. 3. The Appellants do not point to any error in these findings. Rather, referring to column 8, lines 9-12, and all examples of

[7] Examiner's Answer mailed September 20, 2007.
[8] EP 1 080 934 A1 published March 7, 2001.

Nakano, the Appellants argue that the silica particles in the dispersion are "treated with a cationic polymer surface-modifier" which renders the silica particles cationic. App. Br. 2.

Nakano does not disclose that the silica particles are surface-modified with the cationic polymer. Rather, Nakano discloses that the cationic polymer is used as a dispersing agent. Nakano 8:9-12. The Examiner found that mixing silica particles with a cationic polymer as in the dispersion of Nakano is different than surface-modifying the silica particles. The Appellants have failed to direct us to any evidence to the contrary. *In re Schulze*, 346 F.2d 600, 602 (CCPA 1965) ("Argument in the brief does not take the place of evidence in the record.").

Nonetheless, the Appellants argue:

> As dispersants function by attaching to the surface of the particles to be dispersed, the fine particles of Nakano et al will acquire a cationic surface charge associated with such attached dispersant, especially at the relatively low pH of the coating solutions A of Nakano et al (see, e.g., col. 27, lines 46-49).[9]

Reply Br. 2.[10]

The Examiner responds:

> [T]he relationship between the cationic polymeric dispersant of the reference with the surface of the silica particles is not that straight forward. The reference discloses cationic polymeric dispersants for use with both anionic particles (silica) and cationic particles (alumina). It therefore seems unlikely that the dispersant functions by attaching to the particle surfaces. Even if the cationic polymer does attach to the surface of the silica to

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[9] Coating solution A includes a water-soluble resin and a dispersion comprising silica fine particles and a cationic polymer. *See* Nakano 27:52-64.

[10] Reply Brief dated November 20, 2007.

> some degree, the amount of cationic charge that is transferred to the silica is unknown. The degree of reaction relies on many factors, including the amount of cationic polymer present, the pH and the molecular weight of the cationic polymer. Long polymer chains may wrap themselves around the silica particles and may have difficulty reaching the silica surface in large number, thereby being less likely to transfer a significant charge to the silica. Therefore, the degree of surface bonding with the cationic polymer and the affect on the charge of the silica are unknown.

Supplemental Ans. 3-4.

Moreover, Nakano discloses an optional treatment wherein the surface of the inorganic fine particles is treated with a silane coupling agent. Nakano 18:23-31. This optional treatment is separate from dispersing the inorganic fine particles in a cationic polymer. According to the Examiner, "[t]his optional treatment is the type of surface treatment that could render the particle surfaces cationic if enough charge was transferred to them." The Examiner questions why this optional surface treatment would be necessary if the cationic polymer dispersant was intended to modify the surface of the inorganic fine particles. Supplemental Ans. 4. The Appellants have failed to address this point.

On balance, the evidence of record weighs in favor of finding that the cationic polymer dispersant in Nakano does not modify the surface of the inorganic fine particles. Therefore, it is reasonable to find that the colloidal silica in the dispersion of Nakano is anionic.

The Appellants also argue that Tsuchiya does not teach or suggest the use of anionic colloidal silica particles. Instead, the Appellants argue that the silica particles disclosed in Tsuchiya are dispersed with a cationic polymer in an acidic solution. App. Br. 4.

The Appellants' arguments are not persuasive of reversible error. First, the acidic solution referred to by the Appellants is in a comparative example. *See* Tsuchiya 11:1-3.

Second, Tsuchiya does not disclose that the surface of the fine particles is modified by the cationic polymer dispersant, and the Appellants have failed to establish otherwise. Therefore, it is reasonable to find that the colloidal silica disclosed in Tsuchiya is also anionic.

2. Issue 2

The Appellants do not dispute that Tsuchiya discloses fine particles having a size and dispersion degree that overlap the anionic colloidal silica particle size and size distribution recited in the claims on appeal. App. Br. 4, 6. The Appellants, however, argue that the size of the fine particles disclosed in Nakano is outside the claimed range. App. Br. 3.

The Examiner points out that a direct comparison cannot be made between the size of the claimed particles and the size of the particles disclosed in Nakano because the claimed particles are defined by a "median" diameter whereas the particles disclosed in Nakano are defined by an "average" diameter. Ans. 10. Nonetheless, the Examiner found that it would have been within the skill of the ordinary artisan to determine the optimum particle size of commercially available colloidal silica based on desired properties. Ans. 4, 10-11. As explained in *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990), where the difference between the claimed invention and the prior art is a range, the applicant must show that the claimed range is critical.

3. Issue 3

To rebut the prima facie case of obviousness, the Appellants rely on Table VII on page 30 of the Specification to establish that the claimed particle size is critical. App. Br. 3-4.

According to the Appellants, Table VII demonstrates that the use of anionic colloidal particles having the claimed particle size and narrow size distribution provides several advantages over particles of a size employed by Tsuchiya (less than 80 nm) and Nakano. These advantages include higher gloss, faster dry time, good image quality, and improved coating quality. App. Br. 3-4.

Table VII identifies the size and size distribution of the silica particles in Elements 14-20 and Comparative Elements 8-12. Spec. 30. Properties of Elements 14-20 and Comparative Elements 8-12 are reported in Table VIII. Spec. 31.

We make the following observations regarding the data reported in Tables VII and VIII:

1. The colloidal silica dispersion is different in each of Elements 14-20 and Comparative Elements 8-12. *See* Spec. 26:13-30:7. The Appellants have failed to discuss how different dispersions would affect the properties reported in Table VIII.

2. Table VII indicates that K^+ counterions were used in Elements 14 and 15, Na^+ counterions were used in Elements 16-20 and Comparative Elements 8-10 and 12, and no counterions were used in Comparative Element 11. Spec. 30. The Appellants have failed to discuss how different counterions would affect the properties reported in Table VIII.

3. The Appellants use the terms "good," "fair," and "poor" to describe coalescence, bleed, and coating quality in Table VIII. However, the

Appellants have failed to identify the factors considered in rating the results "good," "fair," and "poor." Therefore, it is not clear on this record whether the difference between "good" and "fair" is significant.

4. The evidence is not commensurate in scope with the claims. In particular, the evidence relied on by the Appellants does not report the results of a wide range of particle size distributions for each of the particle sizes in Table VII that fall within the claimed range (Elements 14-19).

5. The Appellants have failed to direct us to any evidence establishing that the results reported in Table VIII would have been unexpected. *Freeman*, 474 F.2d at 1324.

4. Issue 4

The Examiner found that Nakano discloses that the surface pH of the image receiving layer may be adjusted from 3 to 8 to improve resistance yellowing discoloration. Ans. 13; Supplemental Ans. 5; Nakano 16:45-50. The Examiner found that this range overlaps the range recited in claim 33. Ans. 13. The Examiner concluded that it would have been obvious to one of ordinary skill in the art to adjust the surface pH of the image receiving layer in Tsuchiya as disclosed in Nakano to improve resistance to yellowing discoloration. Ans. 13-14.

The Appellants recognize that Nakano discloses a broad pH range of from 3 to 8. The Appellants, however, argue that Nakano discloses that a *preferred* surface pH range is from 5 to 7.5. Reply Br. 3.

Nakano expressly discloses a pH range of from 3 to 8. *Lamberti*, 545 F.2d at 750. There is no dispute that the upper limit of this range "touches" the lower limit of the claimed range. Therefore, the Appellants must show that the claimed range is critical. *Woodruff*, 919 F.2d at 1578. The

Appellants, however, have failed to direct us to any evidence establishing that the claimed range is in fact critical.

The Appellants also argue that Nakano adjusts the surface pH by adding an acid. Referring to column 11, line 3 of Tsuchiya, the Appellants argue that the coating solutions of Tsuchiya are already acidic. Therefore, there would be no need to add additional acid to adjust the surface pH. Reply Br. 3-4.

This argument is not persuasive of reversible error. The portion of Tsuchiya relied on by the Appellants relates to a comparative example. *See* Tsuchiya 11:1-3.

F. CONCLUSIONS OF LAW

The Appellants have not shown that the Examiner reversibly erred in finding that the colloidal silica particles disclosed in Nakano and Tsuchiya are anionic.

The Appellants have not shown that the Examiner reversibly erred in finding that Nakano and Tsuchiya suggest anionic colloidal silica particles having a size and size distribution within the range recited in claim 1.

On balance, the prior art of record and the Appellants' objective evidence of non-obviousness do not establish that the claimed size and size distribution of the anionic colloidal silica particles are critical.

The Appellants have not shown that the Examiner reversibly erred in finding that Nakano suggests modifying the surface pH of the image-receiving layer in Tsuchiya to between 8 and 10 as recited in claim 33.

G. DECISION

The rejection of claims 1, 4, 6-8, 11, 12, 22-29, and 34 under 35 U.S.C. § 103(a) as unpatentable over Nakano, either alone or in combination with Tsuchiya, is affirmed.

The rejection of claims 1, 4, 6-8, 11, 12, and 22-34 under 35 U.S.C. § 103(a) as unpatentable over the combination of Nakano, Tsuchiya, and Niu is affirmed.

The rejection of claims 1, 4, 6-8, 11, 12, 22-32, and 34 under 35 U.S.C. § 103(a) as unpatentable over Tsuchiya is affirmed.

The rejection of claims 1 and 33 under 35 U.S.C. § 103(a) as unpatentable over the combination of Tsuchiya and Nakano is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a) (2008).

AFFIRMED

PL Initial:
sld

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